

What is claimed is:

1. A voltage-controlled tunable filter including:
 first and second cavity resonators;
 means for exchanging a signal between the first and second cavity resonators;
 a first voltage tunable dielectric capacitor positioned within the first cavity
 resonator;
 means for applying a control voltage to the first voltage tunable dielectric
 capacitors;
 a second voltage tunable dielectric capacitor positioned within the second
 cavity resonator;
 means for applying a control voltage to the second voltage tunable dielectric
 capacitors;
 an input coupled to the first cavity resonator; and
 an output coupled to the first cavity resonator.
2. The voltage-controlled tunable filter of claim 1, wherein each of the first
 and second voltage tunable dielectric capacitors includes:
 a first electrode;
 a tunable dielectric film positioned on the first electrode; and
 a second electrode positioned on a surface of the tunable dielectric film
 opposite the first electrode.
3. The voltage-controlled tunable filter of claim 2, wherein the tunable
 dielectric film comprises:
 barium strontium titanate or a composite of barium strontium titanate.
4. The voltage-controlled tunable filter of claim 1, further comprising:
 a plurality of additional coaxial resonators;
 means for exchanging a signal between the additional resonators; and
 a plurality of additional voltage tunable dielectric capacitors, each of the
 additional voltage tunable dielectric capacitors being positioned within one of the additional
 resonators.

5. The voltage-controlled tunable filter of claim 1, further comprising:
 a first rod positioned in the first resonator, wherein the first voltage tunable dielectric capacitor is positioned at one end of the first rod; and
 a second rod positioned in the second resonator, wherein the second voltage tunable dielectric capacitor is positioned at one end of the second rod.

6. The voltage-controlled tunable filter of claim 5, wherein:
 each of the rods in the cavity resonators is serially connected with one of the voltage tunable dielectric capacitors.

7. The voltage-controlled tunable filter of claim 5, wherein:
 each of the rods in the cavity resonators is grounded.

8. The voltage-controlled tunable filter of claim 1, wherein:
 the input comprises a first coupling probe; and
 the output comprises a second coupling probe.

9. The voltage-controlled tunable filter of claim 1, wherein each of the first and second voltage tunable dielectric capacitors includes:

a substrate;

a tunable dielectric film positioned on the substrate; and

first and second electrodes positioned on a surface of the tunable dielectric film opposite the substrate, the first and second electrodes being separated to form a gap.

10. The voltage-controlled tunable filter of claim 9, further comprising:
 an insulating material for insulating the first and second electrodes and the tunable dielectric film from the first and second cavity resonators.

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